

## ROYAL BOTANIC GARDENS, KEW.

## BULLETIN

OF

## MISCELLANEOUS INFORMATION.

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## XXXIII.—A TRIP TO THE KNYSNA.

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In connection with the work for the Botanical Survey of the Union of South Africa (started in 1918), I have used part of my holiday time in making several extensive trips with a view to planning out more detailed work and to getting some more definite information on the limits in my area of the various phytogeographical regions. Incidentally a fair number of plants were collected and observations on them noted. The last trip, which covered over 900 miles, took me from Grahamstown through the southern edge of the Great Karroo, then to the Knysna, the T'Zitzikamma, Uitenhage and back to Grahamstown. It lasted a month from the 19th of December, 1919, of which 16 days were spent at the Knysna. In making such a trip even an old resident of South Africa like myself comes across a hundred and one things of interest apart from botanical matters. The botanical results unfortunately, owing to a terrible drought, were not commensurate with the time spent in travelling. Moreover, the collections made have not been worked up yet, and when this is done they will have to be co-ordinated with the work of other botanical travellers, such as Burchell, Drège, Ecklon, Zeyher, Krauss, Schlechter, Galpin, etc., who have visited the Knysna district. I felt, therefore, some hesitation in accepting at this stage the invitation of the Director of Kew to give an account of my trip. I have, however, picked out of my diary a few items which may be of interest to readers in Europe.

Leaving Grahamstown for Somerset East grassveld is left behind within a few miles even before the descent into the Fish River valley is reached. This broad valley has quite a different climate from that of Grahamstown, and its vegetation is quite karroid. The moment we left the grassveld the effects of extreme drought became apparent. We travelled for about 300 miles up to the neighbourhood of Uniondale without seeing in the veld a single plant in flower except *Acacia Karroo*, and this in a region of summer rains! It is true, even at the best of times, not much rain is expected, but, for

instance, while the rainfall at Willowmore is normally about 10 in., in 1919 only 5 in. had fallen. Not a green blade of grass could be seen, although near Bedford (after emerging from the Fish River valley) there is a good deal of grassveld. Even the small Karroo bushes which are adapted to extreme conditions of drought were withered everywhere, and no doubt a large number of them had died, although it is marvellous to see after a rain how so many of them, which to a casual observer look dead, sprout out again. A good deal of stock had died, yet we saw a fair amount of game, numerous herds of goats, many cattle, etc. Some progressive farmers whom we met had reserves of lucerne and had provided drinking water for their herds by means of boreholes and dams, but it seems a puzzle how the non-progressive farmers (and they are unfortunately in the majority) kept their stock alive, and how the wild bucks managed to subsist. As an example, we will take the south-west corner of the Somerset East district draining towards the Sundays River and the greater part of the Jansenville district. Here we were in what was nothing but a stony desert sprinkled over at intervals with plants, amongst which a cactaceous *Euphorbia* (*E. coerulescens*, Haw.), is the most conspicuous. It occurs in clumps about 3 ft. high. It is locally known as *Noors*. Now this plant, which is spiny, is liked by all kinds of stock. It is slashed by the farmers, and, when half withered, is greedily eaten by the animals, or the dry herbage inside the clumps is fired and the spines are thus partly burned off. Goats and cattle will even tackle the plant as it stands, in spite of the spines. Another succulent *Euphorbia* (*E. esculenta*), which occurs in the same neighbourhood and which is even a better food for stock, is threatened with extermination. Our kind host on one occasion, Mr. P. Weyer, of Toekomst, pointed out to us some other valuable stock-food plants which unfortunately are getting scarce in the Karroo. Amongst them were (apart from others which are well known to S. African botanists): species of *Aizoon*, *Aster* (*Diplopappus*) *Hermannia* and *Cadaba juncea*. In fact, as the late Dr. MacOwan and Dr. Marloth have repeatedly pointed out, when one wants to approach the question of South African pasture plants one must get quite away from the ideas gathered from European text-books.

After my visit beautiful rains fell in the Karroo (as much as 14 in. at Graaff Reinet in two months), and the country looks in many places like a flower garden now (end of March). Especially between the fences bordering the railway line, there is in numerous places thick grass 2-3 ft. high. I had an opportunity to see this between Cradock and Naauwpoort. Owing to overstocking comparatively little grass was seen outside these fences. The dwarf Karroo bushes were supreme.

Visitors fresh from Europe may well wonder how it is that a large part of the Karroo is amongst the finest stock-countries in the world, but one of the most widely spread of the pasture plants, *Pentzia virgata*, has nearly the same feeding value as lucerne. Unfortunately owing to overstocking and kraaling the vegetation is rapidly deteriorating. Owing to kraaling well-defined paths are made by stock which in rain become water-courses. These



become deeper and deeper, they widen out, and dongas are formed which carry off the rainwater rapidly, lower the water-level, etc. Attention has been frequently called to this evil, and it is hoped that before long active steps will be taken to prevent the Karroo from becoming a real desert. Some farmers have at all events tried to preserve the more or less extensive alluvial soils (which are probably the most productive in the world) from being washed away. They have built walls and formed terraces to break the force of the water-currents, and have blocked up dongas which soon get filled with silt that in many cases is excellent for crops. The terraces act at the same time as reservoirs, and on various farms we saw most marvellous results achieved by this method. For instance, on Mr. Codner's farm near Willowmore, we saw a large stack of wheat grown without irrigation in a year with a total of 5 in. of rain, on another field a good yield of green barley had been obtained; higher up there was an orchard with healthy trees of apples, pears, plums, apricots, peaches, etc., all in full bearing and quite healthy.

Five miles from Willowmore *Rhenoster bosch* (*Elytropappus rhinocerotis*) begins. This covers huge areas, especially on the northern slopes of the mountains as far as Grahamstown in the east, and is also widely spread towards the west. It is not touched by any kind of stock. Here and there progressive farmers have eradicated it at great cost. However, until we reach practically the crest of the Langelooft mountains beyond Uniondale the vegetation is to a large extent karroid. Then comes a transformation. Suddenly a few *Proteaceae* make their appearance, and when the crest itself is reached the *Rhenoster* and *Karoo veld* is left behind and pure south-western associations, constituting the true Cape Flora, are seen as far as the eye can reach: *Proteaceae*, *Restiaceae*, *Burmanniaceae*, species of *Cliffortia*, *Watsonia*, *Ericaceae*, *Orchidaceae* and hosts of other plants characteristic of the south-western Cape Flora are here met with in abundance on the southern face of the mountains, and not one (except very close to the top) can be found on the northern slopes. I have on several previous occasions passed these sharp boundaries between the karroid and south-western types, but every time I see one of them it sends a thrill through me. It is just as if we had here a large botanic garden in which the various types of plants were kept separate by artificial means, but as Marloth first pointed out, mists which do not go north of these mountain ranges and increased rainfall account for the whole difference. In fact, if we could get accurate data of the amount of "beneficial" moisture available at different seasons for plants in a particular spot (not mere rainfall statistics), we could, in Cape Colony at all events, fairly accurately predict its type of vegetation. Altitude, as Bolus first pointed out, has very little influence on the distribution of our vegetation. In fact, on the Knysna trip, we found a number of species from an altitude of over 3000 ft. to near to sea-level. Soil also plays a very secondary rôle, for instance, the Knysna forest is partly on Table Mountain sandstone, partly on Bokkeveld beds, which, having been eroded into steep slopes, retain less moisture, and consequently the forest on them is not so tall as that on the Table Mountain sandstone.

After crossing the Langekloof (which on a previous occasion I ascertained to belong throughout its whole length to the South-Western Region), the real descent towards the sea is begun on the Prince Alfred Pass, and the trip from there to the Knysna is certainly the finest in South Africa as far as my experience goes. I will not attempt to describe its beauties which culminated in reaching the Knysna forest.

There are three main groups of forest areas in the region to which the Knysna forest belongs. Henkel\* calls them respectively the George, Knysna and T'Zitzikamma groups. They occur in a tract of country lying between the Great Brak River beyond George and Clarkson, near Humansdorp. They are all south of the Outeniqua—T'Zitzikamma—Kareedouw Range of mountains, the average height of which is 4000 ft., some of its peaks rising over 5000 ft. But high forest is seldom found over 2000 ft., and is consequently almost entirely restricted to the foothills of these mountains, hiding itself to a certain extent in deep ravines. The total area of high forest is approximately 112,000 acres, and Mr. Henkel estimates that possibly 10,000 acres have been destroyed by recurring fires. Of the total amount 70,000 acres belong to the Knysna group which contains the largest patch of forest in South Africa—the Knysna forest. From what has been said it follows that if we take a bird's-eye view of the zone in which these forests are located their total extent, even allowing for former extension, is hardly sufficient for one to denote this area as "the" Forest Region of South Africa and to contrast it with the South-Western Coast Region and other primary divisions. Leaving out of account the areas of the mountain ranges themselves and the Langekloof which all have typical south-western vegetation (apart from enclosures of karroid succulent vegetation on suitable rocky exposures), and which cannot be separated from the area under discussion, a rough calculation shows that the George forest patches occupy about  $1/25$  of the area in which they occur, the Knysna group occupies  $1/5$ , and the T'Zitzikamma group about  $1/8$  of its area. To put it in a different way: on the narrow coast plateau on which these groups are mostly found with an area of over 15,000 square miles, there used to be about 190 square miles of forest of which about 175 square miles remain, the remainder (apart from coast vegetation and patches of karroid vegetation) is typically south-western. On other grounds to which reference will be made, the separation of this part of South Africa as a Forest Region, as first introduced by Rehmann, is not advisable.

The more important trees in the high forest† are *Ocotea bullata* (4 per cent.), *Podocarpus elongata*, *P. Thunbergii* (11 per cent.), *Cunonia capensis*, *Olea laurifolia* (18 per cent.), *Nuxia floribunda*, *Curtisia faginea*, *Platylophus trifoliatus*, *Apodytes dimidiata*,

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\* Henkel, the indigenous high forest situated in the divisions of George, Knysna and Humansdorp. "S. A. Journ. of Science," Nov., 1912.

† See Henkel, l.c. p. 70, and Marloth, Das Kapland. The figures in brackets denote the percentage the trees represent in the Knysna forest. There are nearly 50 different kinds altogether, many of which constitute only a small fraction of the total.



*Pterocelastrus variabilis* ( $7\frac{1}{2}$  per cent.), *Gonioma Kamassi* ( $15\frac{1}{2}$  per cent.), *Virgilia capensis*. Others do not occur so frequently. In one patch at the Knysna *Faurea saligna* is found. The understorey of shrub growth consists principally of *Trichocladus crinitus* and numerous ferns, especially the beautiful tree-fern, *Hemitelia capensis*. Of the trees mentioned, *Ocotea bullata* has somewhat discontinuous distribution in the coast districts of South Africa, the genus *Faurea* does not occur again in an easterly direction until the Bashee River in the Transkei has been crossed. *Virgilia capensis* is south-western and stops at Van Stadens, near Port Elizabeth. *Platylophus trifolius* does not reach the Cape Peninsula in the west and also does not extend beyond Van Stadens. Thus there is a certain amount of endemism: but on the whole we recognise that these forest patches—like the forest patches further east—are distinctly outliers of the Tropical African forest flora. In a sense they are intruders which cannot be utilised to form primary phytogeographical divisions. They are found only where the configuration of the country and other circumstances favour a greater rainfall than is found in neighbouring parts and where the plants are protected from drying winds, although all these forest trees are slightly xerophytic. It is, therefore, not likely that the South African forests, even in our narrow coast districts, had ever a wider distribution as long as climatic conditions were approximately what they are now, although the discontinuous distribution of some trees, shrubs and other forest plants seems to point in the opposite direction, and although we know that since the advent of man much forest growth has been destroyed. I have already referred to the discontinuous distribution of *Ocotea bullata* and *Faurea*. A few more examples may be quoted. *Pygeum africanum* occurs at Bluekrantz, near the Knysna, and is not found again in an easterly direction until we come to the neighbourhood of King Williamstown, a distance of about 250 miles. *Streletizia augusta* is also found at Bluekrantz, and is not met with again when travelling eastwards until Natal is reached. Mr. J. D. Keet, district forest officer, Knysna, drew my attention in the forest to a tree-orchid which in its vegetative organs is exactly like *Calanthe natalensis*, not previously found west of the Pirie bush near King Williamstown. However, until this orchid has been examined when in flower, we cannot be quite sure that it is this species. Amongst animals inhabiting South African forests there are also very striking instances of discontinuous distribution known.

South Africa uses up an enormous amount of timber every year, chiefly for railway-sleepers, house-building, mine-props, wagon-building, furniture, etc., but it is very far from self-supporting in this respect. In former years the system of working, even of the Government forests, has been lamentable, and many parts of them have been ruined for an indefinite period. During the last 25 years or so, however, a rotation system has been introduced which allows a definite supply to be drawn from certain sections, while others have a chance to recuperate. Fortunately such a valuable tree as *Ocotea bullata* (Stinkwood) coppices freely, yellowwoods sow themselves freely, but all our South African valuable timber trees grow very slowly, and even do not flourish as well

in plantations as in their natural conditions. Much experimental work on this and other points remains, however, to be done yet, and some experiments are actually in progress at Concordia, close to the town of Knysna. In the meantime large plantations of exotic trees have been made in many places between George and Storms River (as also in other places in South Africa), and others are being formed. Before many years are past the timber from the Government plantations will exceed in value that from the natural forests, though the latter will continue to furnish valuable timber, especially for furniture, wagon-making, etc. At Concordia *Pinus insignis*, *Pinus Pinaster*, and *Eucalyptus rostrata* are chiefly grown. In another plantation we saw *Pinus canariensis*, which looked healthy and had made a good start; *Cryptomeria japonica*, Cork oak, Cedar, and the Camphor tree were not doing particularly well. Many others are being tried, but it is too early yet to pronounce judgment on them. *Ocotea bullata*, *Xanthoxylon capense*, *Curtisia faginea*, *Nuxia floribunda*, *Toddalia lanceolata* come up self-sown between pines, and it remains to be seen whether it will be worth while to retain them under these conditions. I should like to have enlarged more on the Knysna forest, on its wealth of Fungi, Bryophytes, Ferns, etc., on its climbing plants and epiphytes, but space forbids, nor can I touch on the very interesting plant formations and associations found outside the forest. The whole stretch of country from George to near Humansdorp is a botanical paradise which botanists so far have only glanced at, as the difficulties of travelling in it, even to this day, are very considerable, and large parts of even the main roads have to be negotiated very cautiously, especially in wet weather. To anybody not used to South African motor travelling it will be a novel experience to dip down into such a spot as the Bluekrantz gorge and crawl out again, or to slither into the Elands River drift. The denseness and wildness of the Knysna forest may be gauged by the fact that there is still a small herd of elephants in it; in fact, we saw their spoor near Deepwalls, close to the main road.

On our return journey we passed along the T'Zitzikamma road. As we ascended the Pass over the Kareedouw mountains, near Assegai Bush, the effects of severe drought became again apparent, and were simply appalling further on in the Uitenhage and Alexandria divisions. To give only one instance: I stopped at the corner of the Witteklip, near Van Stadens, where normally there is an abundance of flowers of plants of the South-Western types, yet I could get absolutely nothing, nor did I see anything in flower in the karroid scrub, which one reaches a few miles further on, when one has crossed the crest of the plateau, except the weird inflorescences of the plant which Baker calls *Urginea altissima*. In concluding this very brief sketch a few points of phytogeographical interest met with on the return journey may be mentioned. At Kabeljauws river, a few miles east of Humansdorp, *Acacia karroo*, which we had not seen since leaving the Karroo, was again met with. Here also is the western limit of Tree-Euphorbias (*E. tetragona*). I have on another occasion pointed out that the South-Western Region goes as far



as Port Elizabeth. This, of course, does not mean that elements characteristic of other regions are absent from it; in fact, here and there, more or less large associations which seem to be foreign to the region occur, for instance, associations of forest plants and Karroo plants, as pointed out already. From the heights east of the Gamtoos River to the beginning of the Van Stadens Gorge we travelled through typical South-Eastern grass country with scattered bush such as we find near Bathurst, south of Grahamstown. The last point I would like to refer to is this. On a previous trip I had confirmed one of Ecklon's observations—unfortunately overlooked by Bolus and others—that karroid vegetation stretches from Port Elizabeth to the mouth of the Sundays River, thus forming a broad wedge between the South-Eastern and South-Western Regions. I noticed that this wedge consists, near Coega, partly of low karroid shrublets (including *Pentzia virgata*). On the trip here dealt with I travelled from Uitenhage to Coega, and I ascertained that there are extensive flats on this road covered with these karroid shrublets. Karroid vegetation is also found all over the hill called the "Coega Kop," which is composed of Table Mountain sandstone, another of the numerous instances which we have of the secondary influence of geological formation on the distribution of plants in South Africa.

#### XXXIV.—PHELLODENDRON.

T. A. SPRAGUE.

The genus *Phellodendron* (*Rutaceae-Toddalieceae*) was described by Ruprecht in 1857 from specimens collected by Richard Maack in Amurland.\* An excellent detailed generic description is given in Sargent's *Trees and Shrubs*, i. p. 195 (1905); the following diagnosis may, however, be useful to those who are unable to consult that work.

*Trees* with opposite, imparipinnate leaves. *Axillary bud* concealed in a little pocket between the base of the petiole and the stem. *Leaflets* very finely crenulate-serrulate or subentire, dotted with pellucid glands along the margins. *Flowers* paniculate, dioecious, pentamerous. *Calyx* small, 5-lobed. *Petals* much larger, boat-shaped, greenish-yellow, slightly imbricate. *Disc* none. *Male flower*:—*Stamens* 5, hypogynous, alternating with, and about twice as long as the petals; anthers sagittate, introrse. *Gynophore* oblong, bearing 5 rudimentary villous pistils. *Female flower*:—*Staminodes* 5, very small. *Ovary* subglobose, glandular-punctate, 5-locular, with a very short thick style and depressed-capitate, 5-lobed stigma. *Ovules* solitary, pendulous. *Fruit* a drupe with aromatic flesh enclosing 5 pyrenes. *Endocarp* cartilaginous, translucent. *Seeds* with a thin layer of endosperm. *Embryo* large; cotyledons flat.

The type-species, *Phellodendron amurense*, Rupr., is a tree with extremely corky bark (whence the generic name, meaning "Cork

\* Bull. Acad. Pétersb. xv. p. 353 (1857).

Tree"), which is used by the native fishermen of the middle Amur for making floats for their nets. It has a wide distribution in Russian and Chinese Manchuria, and has also been recorded from Corea and Japan.

The form which occurs in the island of Sachalin has a smooth, not corky bark, and was described as var. *sachalinense* by Friedrich Schmidt, with the following diagnosis: "ramis junioribus omnino esuberosis, foli[ol]is latoribus brevioribus, seminibus quam in planta amurensi magis convexis minoribus."\* Schmidt cited a specimen collected by Albrecht, near Hakodate, in Japan, as apparently belonging to the same variety. In spite of careful investigation, he was unable to find sufficient differential characters to justify the separation of var. *sachalinense* as an independent species. Sargent, however, raised the variety to specific rank as *Phellodendron sachalinense*.† His description was drawn up, mainly, if not entirely, from trees which had been raised in the Arnold Arboretum in 1887 from seeds sent from Japan. According to him, *P. sachalinense* differs from *P. amurense* in the darker colour of the branchlets, the thinner, not corky bark, rufous-pubescent, instead of silvery-pubescent, winter buds, leaflets not lustrous on the upper surface, glabrous on the margins, and the glabrous inflorescence. The type specimen of var. *sachalinense* in the Kew Herbarium (Tunai, September, 1860, Schmidt) has, however, a distinctly pubescent inflorescence and infructescence, so that the last character does not hold good. The axillary buds are rufous-pubescent, and the leaflets have glabrous margins, but the remaining characters cannot be verified from the herbarium specimen.

According to Sargent, the Japanese tree which has hitherto passed under the name *Phellodendron amurense*, should be called *P. sachalinense*. He cited Japanese specimens of the latter species, but none of the former, and suggested that *P. amurense*, Franch. et Sav. Enum. i. p. 73, was a synonym of *P. sachalinense*.

Sargent's views may be summarised in the following propositions: 1, that the Arnold Arboretum *sachalinense* is specifically distinct from *P. amurense*; 2, that it is identical with *P. amurense*, var. *sachalinense*, Fr. Schmidt; 3, that it occurs in a wild state in Japan, near Hakodate and Sapporo.

(1) The evidence for the specific status of *sachalinense* seems insufficient: trees raised at Kew from seeds received as *P. sachalinense* in 1904 from the Arnold Arboretum, agree with Sargent's description in having a non-corky bark, but the leaflets are ciliate and lustrous on the upper surface, and the inflorescence is not glabrous. *Phellodendron* is dioecious, however, and the seeds may possibly have been the result of a cross with some other species or variety cultivated in the Arnold Arboretum. On the other hand, a tree received in 1910 from the Japanese Exhibition, and grown at Kew under the name *P. sachalinense*, also has a non-corky bark and ciliate lustrous leaflets, so that unless this also was a hybrid, the leaflets of *P. sachalinense* evidently do not

\* Reisen in Amur-lande, p. 120 (1868).

† Trees and Shrubs, i. p. 199 (1905).



differ from those of *P. amurense* in being dull on the upper surface and having glabrous margins. Nor does there appear to be any marked difference between *sachalinense* and *amurense* in the colour of the branchlets. It seems desirable, therefore, to treat the cultivated *sachalinense* as a variety of *amurense*.

(2) Sargent's identification of the cultivated *sachalinense* with *P. amurense* var. *sachalinense*, Fr. Schmidt, may, on the other hand, be accepted. Both trees differ from typical *amurense* in having a non-corky bark, and relatively broader leaflets.

(3) The identification with var. *sachalinense* of the Japanese tree, hitherto known as *P. amurense*, is open to question. The leaflets of wild specimens from Japan certainly resemble those of var. *sachalinense* in shape, but the labels afford no information as to the nature of the bark, which furnishes the most important character of the variety. Furthermore, the figures of the bark of Japanese *amurense* given by Shirasawa, Ic. Ess. For. Jap. ii. t. 33, ff. 27, 28 agree, in the writer's opinion, with typical *amurense* rather than with var. *sachalinense*. The question is recommended to the attention of Japanese botanists, as it can be elucidated most satisfactorily by a study of the living trees.

It is, moreover, complicated by the existence in Japan of another variety or form of *P. amurense*, which Dode has described as an independent species, *P. Lavalleyi*, from a tree of Japanese origin cultivated in the Arboretum at Segrez.\* This differs from *P. amurense*, according to Dode, in the leaflets, which are lanceolate-ovate instead of lanceolate, and have the nerves of the lower surface clothed with stiff white hairs. It has been in cultivation in England for about 40 years, and has hitherto passed under the names *P. japonicum* and *P. sachalinense*. Apart from the indumentum, it seems to differ in no respect from the usual Japanese form of *P. amurense*, and it may therefore be named *P. amurense* var. *Lavalleyi*.

A specimen in the Kew Herbarium, gathered by Tschonoski in 1865 in subalpine woods in the province of Nambu, Nippon, agrees with var. *Lavalleyi*. Sargent referred the corresponding specimen in the Gray Herbarium to *P. japonicum*, from which the Kew specimen differs in the cuneate base of the leaflets, and the nature of the indumentum.

*Phellodendron japonicum*, Maxim., appears to be confined to Fujiyama, and is well characterised by the thin bark which peels off in small scales, the shorter and broader leaflets, rounded at the base and softly pubescent on the lower surface with rather curly hairs, and the larger fruits.

A third species which is in cultivation at Kew is *P. chinense*, Schneider, of which *P. sinense*, Dode, is a synonym. This is a native of Hupeh, and may easily be recognised by its very compact inflorescence.

*Phellodendron macrophyllum*, Dode, and *P. Fargesii*, Dode, are known to the writer from description only, and do not appear to be in cultivation. The former has very large leaflets, up to 20 cm.

\* Bull. Soc. Bot. France, lv. p. 648 (1909).

long and 9 cm. broad; and the latter has a small compact inflorescence, resembling that of *P. chinense*, from which it differs in the narrower leaflets. Both are natives of Szechuan.\*

The cultivated species and varieties of *Phellodendron* may be distinguished as follows:—

Inflorescence compact; leaflets oblong-lanceolate with nearly parallel margins 3. *chinense*.

Inflorescence lax:

Leaflets broadly ovate, rounded at the base, shortly acuminate, softly and rather densely pubescent on the lower surface; bark thin, peeling off in small scales ... .. 2. *japonicum*.

Leaflets ovate, ovate-lanceolate or lanceolate, not softly pubescent on the lower surface:

Nerves more or less pilose on the lower surface; bark of trunk and old branches corky ... .. 1. *amurense*, var. *Lavallei*.

Only the base of the midrib pilose on the lower surface:

Bark not at all corky ... .. 1. *amurense*, var. *sachalinense*.

Bark of trunk and old branches corky ... .. 1. *amurense*.

1. *P. amurense*, *Rupr.* in Bull. Acad. Pétersb. xv. p. 353 (1857); Maxim. Prim. Fl. Amur. p. 72, t. 4; Regel, Fl. Ussur. p. 42; Fr. Schmidt, Reisen in Amur-Lande, p. 37; Franch. Pl. David. p. 67, Komarov, Fl. Manshur. ii. p. 668; Franch. et Sav. Enum. Pl. Jap. i. p. 73; Shirasawa, Ic. Ess. For. Jap. ii. t. 33, ff. 16-30; Matsum. Ind. Pl. Jap. ii. pars. 2, p. 293; Nakai in Journ. Coll. Sc. Tokyo, xxvi. Art. 1, p. 117; Sarg. Trees and Shrubs, i. p. 197, t. 93; Schneider, Ill. Handb. Laubholzk. ii. p. 125; Bean, Trees and Shrubs, ii. p. 131.

*Distrib.* Russian and Chinese Manchuria, Northern China, Corea, Japan.

The writer, for reasons already given, follows Franchet and Savatier, Shirasawa and Matsumura in recording *P. amurense* from Japan. Pritzl (in Engl. Jahrb. xxix. p. 424) cites several specimens of *P. amurense* from Central China. The one collected by Henry is evidently *P. chinense*, Schneider. The other specimens should be re-examined.

var. *sachalinense*, *Fr. Schmidt*, Reisen in Amur-Lande, p. 120 (1860); Palibin, Consp. Fl. Kor. i. p. 51; Nakai in Journ. Coll. Sc. Tokyo, xxvi. Art. I, p. 117; Miyake et Miyabe, Fl. Saghalin, n. 124.—*P. sachalinense*, Sarg. Trees and Shrubs, i. p. 199 (1905); Bean, Trees and Shrubs, ii. p. 132.

*Distrib.* Sachalin, Corea (fide *Palibin*).

\* Bull. Soc. Bot. France, lv. pp. 648, 649 (1909).



This variety is cultivated in Japan, and may possibly be indigenous there. It differs from typical *amurense* mainly in the nature of the bark, so that it is hardly possible to recognise it from herbarium specimens unaccompanied by notes or samples of bark. Sargent records *P. sachalinense* from Szechuan (Pl. Wilson. ii. p. 136). The writer has not seen the specimens cited.

var. *Lavallei*, *Sprague*.—*P. Lavallei*, Dode in Bull. Soc. Bot. France, lv. p. 648 (1909).

*Distrib.* Japan: Province of Nambu, in subalpine woods, 1865, *Tschonoski*.

2. *P. japonicum*, *Maxim.* in Bull. Acad. Pétersb. xvi. p. 212 (1871); *Mél. Biol.* viii. p. 1; *Franch. et Sav. Enum. Pl. Jap.* i. p. 73; *Matsum. Ind. Pl. Jap.* ii. pars 2, p. 293; *Hayata, Veg. Mt. Fuji*, p. 75; *Schneider, Ill. Handb. Laubholzk.* ii. p. 125; *Bean, Trees and Shrubs*, ii. p. 131.

*Distrib.* Japan: Fujiyama, in the deciduous broad-leaved tree-region.

According to Matsumura, *P. japonicum* is confined to Fujiyama. Sargent, *Trees and Shrubs*, i. p. 201, cited under *P. japonicum*, *Tschonoski*'s specimen from Nambu, which the writer refers to *P. amurense*, var. *Lavallei*; and Henry's no. 4003, from Hupeh, which is *P. chinense*, *Schneider*, as he himself subsequently recognised (Pl. Wilson ii. p. 137).

*Pritzelt* recorded the occurrence of *P. japonicum* in Central China, which is highly improbable (*Engl. Jahrb.* xxix. p. 424).

3. *P. chinense*, *Schneider*, *Ill. Handb. Laubholzk.* ii. p. 126 (1907); *Sarg. Pl. Wilson.* ii. p. 136; *Bean, Trees and Shrubs*, ii. p. 131. *P. sinense*, Dode in Bull. Soc. Bot. France, lv. p. 649 (1909). *P. amurense*, *E. Pritzelt* in *Engl. Jahrb.* xxix. p. 424, non *Rupr.*

*Distrib.* China: Hupeh, *Wilson* 1972, 2739; Patung District, *Henry* 4003, 5202.

## XXXV.—ON TWO SPECIES OF OVULARIOPSIS FROM THE WEST INDIES.

E. M. WAKEFIELD.

Since 1906 lists of fungus diseases of plants in the West Indies have contained references to a mildew on cotton, which has been called, for the sake of distinction, the "West Indian Leaf Mildew" of cotton, as it was apparently unknown from any other part of the world.\* In the *West Indian Bulletin*, 1916, p. 118, the disease was briefly described as follows:—

"The disease occurs on both native and cultivated cotton. Leaves attacked by the fungus turn yellow or red in irregular

\* It may be noted, however, that Dr. Butler in his book "Fungi and Disease in Plants," p. 363, has recorded the occasional occurrence of a similar disease in Bombay.

areas, frequently at first bounded by the large leaf veins. Finally, the whole leaf is affected, turns yellow and drops off. The under sides of diseased leaves are covered with a white, shining mildew, there is also an internal mycelium in the tissues of the leaf. . . .

"The conidia are unicellular, large, and oblong with rounded corners; they are borne singly on short conidiophores.

"So far the disease has only appeared on old leaves which have passed their prime, in which case it simply hastens the fall. . . . In Montserrat, last year, it was said to be more serious."

Since this note was published the disease has been recorded from year to year, in varying intensity, but little work appears to have been done on it, and the fungus has remained unidentified.

Recently Mr. Nowell submitted to Kew typical specimens of this cotton mildew, and also of a somewhat similar mildew on *Tecoma leucocorylon*, with a request that they should be identified if possible.

Microscopic examination at once showed that both belong technically to the genus *Ovulariopsis*, Pat. and Har., which is distinguished from *Oidium* by its solitary or almost solitary conidia, and partly internal mycelium, and from *Oidiopsis*, Scalia, by the presence of external as well as internal mycelium. The question of specific identity, however, is one of some little difficulty.

Salmon\* noted that the type species of the genus *Ovulariopsis*, *O. erysiphoides*, and also the later described *O. moricola*, Del., agree morphologically with the conidial stage of *Phyllactinia corylea*. He came to the conclusion that the genus represents the conidial stage of *Phyllactinia*, and that both the described species were identical with *P. corylea*. In support of this theory, he later† described the range of variation in the shape of conidia and conidiophores in this species, and distinguished certain well-marked varieties which are associated with particular host-plants.

In view of this known variability of the conidia, and the long list of host-plants already recorded for *P. corylea*, one hesitates to describe any *Ovulariopsis* as a new species.

On the other hand, the fact has to be taken into consideration that in neither of the present West Indian forms has any perithecial stage been observed. If it occurred, it is strange that it should not have been seen in so well known a disease as the cotton mildew. Climatic conditions could hardly be supposed to prevent the development of the perithecial stage, for *P. corylea* is known from both tropical and temperate South America.

In addition to the negative character of the absence of any perfect stage, the two forms under consideration possess fairly distinctive morphological characters, differing from those of *P. corylea*. In the case of the cotton mildew, the diseased areas of the leaf are very sharply marked. In the dried specimen they are almost black on the upper surface, and covered with a fairly dense powdery growth of mildew below. In no specimen of *P.*

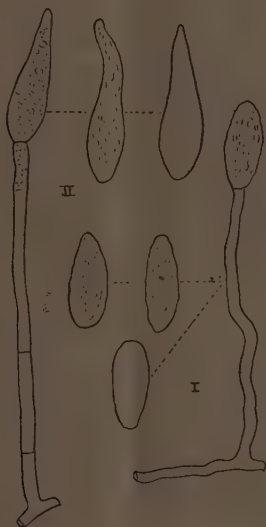
\* Ann. Myc. ii. 1904, p. 438.

† Ann. Myc. iii. 1905, p. 493.



*corylea* have such marked effects on the host tissues been observed. The mature conidia are regularly oblong or elliptical, not clavate as in typical *P. corylea*. Salmon mentioned (loc. cit., p. 496) that he had observed conidia departing from the type on *Gossypium* sp., but he does not appear to have described these further.

In the case of the mildew on *Tecoma leucoxydon*, the fungus also occurs more or less broadly effused on the under side of the leaf, but does not cause marked discoloration. The conidia here are almost all much narrowed towards the apex, and may reach over 90  $\mu$  in length, which is greater than any measurement recorded for *P. corylea*.



i. *Ovulariopsis Gossypii*, Wakef.  
ii. *O. obclavata*, Wakef.,  $\times 250$ .

In view of these facts, it seems advisable, for the present at any rate, to give these forms distinctive names. Descriptions are therefore appended.

### ***Ovulariopsis Gossypii*, Wakef., sp. nov.**

*Maculae* amphigenae, e fulvo rubescentes dein atro-purpureae, irregulares, primo punctiformes demum late confluentes. *Caespituli* hypophylli, effusi, albido-farinosi. *Mycelium* hyalinum, pro maxima parte superficiale sed hyphis paucis per stomata in mesophyllum penetrantibus. *Hyphae* steriles repentes, tortuosae, parce septatae, 5-6  $\mu$  diametro; hyphae conidiferae erectae, flexuosae, 70-170  $\times$  6-7  $\mu$ . *Conidia* acrogena, solitaria, oblonga vel elliptica, 50-60  $\times$  16-22  $\mu$ , episporio laevi vel demum plus minus reticulato-rimoso.

*Habitat.* On old leaves of "Sea Island Cotton" (*Gossypium barbadense*) Barbados, April, 1920, W. Nowell.

**Ovulariopsis obclavata**, Wakef., sp. nov.

*Maculae* indistinctae vel nullae. *Caespituli* hypophylli, effusi, albido-farinosi. *Mycelii* pars intramatrix, pars superficialis. *Hyphae* steriles tortuosae, parce septatae, 5–6  $\mu$  diametro; hyphae conidiferae erectae, ad 220  $\mu$  altae, 8  $\mu$  crassae. *Conidia* acrogena, solitaria, obclavata, sursum magis attenuata, 66–94  $\times$  20–24  $\mu$ , guttulata, episporio laevi vel rimoso.

*Habitat.* On leaves of *Tecoma leucoxydon*, Barbados, April, 1920, W. Nowell.

## XXXVI.—AMOORA SPECTABILIS AND A. WALLICHII.

H. H. HAINES.

The tree we are here concerned with is one described by Sir George King in the Journal of the Asiatic Soc. of Bengal, lxiv. p. 56, as *Amoora Wallichii* from specimens in the Calcutta Botanic Gardens undoubtedly named by Wallich *Sphaerosacme spectabilis* and taken from a tree originally brought from Goalpara in Assam.

*Amoora spectabilis*, Miq., is described in Ann. Mus. Lugd. Bat. iv. 37, also, as Miquel says, from a tree in the Calcutta Botanic Gardens called *Aglaia spectabilis*, the native country of which was unknown to him.

Hiern, in the Flora of British India, described what he considered to be *A. spectabilis*, Miq., from fruiting specimens collected by McClelland, near Rangoon, adding the characters of the flowers from Miquel's description of *Amoora spectabilis*.

King (l.c.) gives as synonyms for his *Amoora Wallichii* "*Sphaerosacme spectabilis*, Wall. MSS. in Herb. Calc., *Amoora spectabilis*, Hiern (not of Miquel) in Flor. Brit. Ind. i. 561," and he writes:—

"There has been some confusion in dealing with this plant. The description given is that of Wallich's own specimen (in flower) taken from a tree grown in the Botanic Garden, Calcutta, which had originally been brought from Goalpara in Assam . . . Miquel has described under the name *Amoora spectabilis*, a plant of which he says *Sphaerosacme spectabilis*, Wall. is the type. But Miquel's description does not fit Wallich's plant at all. Mr. Hiern, taking Miquel's name, *A. spectabilis*, describes under it a plant from Burmah which is certainly not Miquel's plant; but which may be the same as *Sphaerosacme spectabilis*, Wall."

It may be noted that Dr. Stapf considers King to have made an erroneous statement in saying that Miquel considered *Sphaerosacme spectabilis*, Wall., as the type of his *Amoora spectabilis*, because Miquel does not mention the name *Sphaerosacme spectabilis* at all. But probably all that King intended to convey was that Miquel believed he was describing the same tree as was called by Wallich *Sphaerosacme spectabilis* (= *Aglaia spectabilis*).



Neither King nor Miquel would appear to have seen Wallich's *S. spectabilis* at Kew. Wallich's No. 1277B, so named, resembles, and probably is, *Amoora Rohituka*, W. & A. It is not our plant. But there is another specimen of Wallich's, viz., No. 1278, also from Goalpara, called *Sphaerosacme Rohituka*, which is certainly the same as *Amoora Wallichii*, King. No. 1278 is quoted by Hiern (l.c.) under *Amoora cucullata*, but there are two species here under the same number, one being *A. cucullata*, the other *A. Wallichii*. Dr. Stapf has come to the conclusion that there has been a misplacement of labels, and that Wallich consistently called the tree under discussion *Sphaerosacme spectabilis*. As his note on this subject is of considerable interest it is reproduced below (p. 241), but the question to be decided here is whether, in the face of Sir George King's opinion quoted above, his *Amoora Wallichii* and Miquel's *Amoora spectabilis* are the same. The type of Miquel's species is not available. The Director of Kew has caused inquiries to be made for it, both at Leyden and at Utrecht, but it appears to be at neither of these herbaria.

The species, especially if the Andamans tree (see below) is conspecific, appears variable. Most of the Indian material dissected by me shows the teeth of the staminal tube rounded and only 8-9 half-exserted anthers, but King describes the teeth as acute (I think from the Andamans plant, which has acute teeth) and the anthers as 10, and some of my Duars specimens have shallow rounded teeth and 10 anthers. Miquel says "tubus urceolatus glaber dentibus 8 brevibus retusis; antherae 8 (an et 9?)."

King describes the panicles as bisexual, "the female flowers mixed with the males and exactly like them, but with a pyramidal prominently 3-angled tawny pubescent 3-celled ovary crowned by a stigma as in the male." In all the specimens seen by me the flowers are only *apparently* monoecious, and the female inflorescence is quite different from the male. No true female specimens are found in the herbaria, except in fruit. It is remarkable that if the panicles are really bisexual, as described above, that the fruits are always on very short racemiform panicles not more than 3-4 in. long, whereas the flowering supposedly bisexual panicles are diffuse and exceed one foot in length. A fruiting tree was therefore marked by me and flowering specimens subsequently collected from the same tree through the kindness of Mr. Haslett, in whose district it was growing. These, undoubted females, all turned out to be on short racemes, not or scarcely paniced, whereas a dissection of the paniced flower from another tree collected by Mr. Lace in the same locality (*Lace* 2501 marked *Amoora Rohituka*, Puri), has convinced me that, though the flowers are hermaphrodite in form, functionally they are not so, as the well-developed ovary has abortive or no ovules. A dissection of specimens from the Duars and Assam led to the same conclusion, and so did also a dissection of King's specimen collected in the gardens at Calcutta and supposed to have been one of Wallich's trees from Goalpara.

If Miquel's description of *A. spectabilis* and King's description of *A. Wallichii* are compared with one another, and with the

revised description of the tree given by me below, it will be seen that Miquel's does not differ much more than does King's from this revised description, which is based on a far larger number of specimens than these botanists had access to, and it appears possible, or even probable, that the tree grown in the Calcutta gardens, described by Miquel as *Amoora spectabilis*, was the same as the tree grown in the same gardens and called by Wallich *Sphaerosacme spectabilis* = *Amoora Wallichii*, King. Dr. Stapf states that he has no doubt that the two are the same, and therefore that the older name *Amoora spectabilis*, Miq., must stand.

#### REVISED DESCRIPTION.

***Amoora spectabilis*, Miq.** in Ann. Mus. Bot. Lugd. Bat. iv. 37; Hiern in Hook. f. Fl. Brit. Ind. I. (561, at least in part). Syn. *Amoora Wallichii*, King in Journ. Asiat. Soc. Bengal, LXIV. 56; *Sphaerosacme Rohituka*, Wall. Cat. no. 1278 (in part).

A tall handsome dioecious tree with a considerable trunk and a high crown. Sap of young parts milky; bark smooth, pale, blaze rather soft, streaked with brown and exuding drops of milky juice; twigs stout, rusty tomentose. *Leaves* crowded at the ends of the twigs 15 in. to 3 ft. long, odd-pinnate; rhachis stout, up to 22 in. long (with the petiole), grey or rusty with microscopic fimbriate scales and minute stellate hairs when young; leaflets opposite or subopposite, 9-19 or only 3-7 near the panicle, attaining 11 in. by 5 in. or terminal up to 14 in.; decreasing in size towards the base of the rhachis, terminal elliptic, lateral oblong or those at base ovate and somewhat reflexed, acute or acuminate with obliquely rounded base, secondary nerves spreading then up-turned, 12-20 each side, distinct, often with small scattered rusty scales beneath, petioles  $\frac{1}{2}$ - $\frac{3}{4}$  in., of terminal leaflet 1-1 $\frac{1}{2}$  in. long. *Male panicles* 9-22 in. long from the upper axils, inclined or suberect, very stout, with main branches 2 $\frac{1}{2}$ -8 in. long, ultimate branchlets cymose with rather crowded flowers on very short rusty pedicels. *Flowers* subglobose,  $\frac{1}{12}$ - $\frac{1}{8}$  in. in Orissa specimens,  $\frac{1}{16}$ - $\frac{1}{8}$  in. in north-eastern specimens. *Calyx* saucer-shaped with 3 obtuse lobes rusty-tomentose. *Petals* 3, orbicular, concave, thinly tomentose on the parts exposed in bud. *Staminal tube* with a broad mouth and 8-10 rounded teeth or faintly crenate or (in the Andamans plant) with acute teeth; anthers scarcely or half exserted, connective incurved acute. *Pistillode* depressed-globose, tomentose, resembling the pistil of the female flower, but with fertile or rudimentary or no ovules. *Female panicles* sub-racemose, stout, 2 $\frac{1}{2}$ -4 in. long, rusty. *Flowers* on very stout pedicels  $\frac{1}{4}$ - $\frac{3}{8}$  in. long, supported by subulate bracts  $\frac{1}{2}$  in. long. *Calyx* lobes 3-4 ovate. *Petals* as in the male, 3 or 4. *Staminal tube* as in the male; anthers well-developed with lateral slits, each containing a linear pollen mass. Ovary depressed, brown-tomentose, 3-4-celled with two superposed ovules in each cell; stigma very large, purple, 3-4-lobed. *Capsule* subglobose, 2 in. in diameter, 3-4-celled and 3-4-valved, with milky juice when unripe, tomentose. *Seeds* 1-4 with chestnut-coloured testa and scarlet aril; radicle transverse to axis of seed, plumule tomentose.



**Distribution:**—Throughout the plains and low hills of north-east India from the Sikkim Terai to Assam and Burmah; mountain valleys of Orissa, Mayurbhanj and Singbhum, extending to Ganjam in Madras; Andamans, *King* (but possibly different).

NOTE BY DR. O. STAFF.

King says (Mat. i. 57): "The description above given is that of Wallich's own specimen (in flower) taken from a tree grown in the Bot. Gard. Calcutta, which had originally been brought from Goalpara in Assam," and he quotes, among the synonyms, "*Sphaerosacme spectabilis*, Wall. MSS. in Herb. Calc." It is clear then, that King drew up his description (apart from the fruits) from an unnumbered specimen of Wallich's in the Calcutta Herbarium. That is no doubt the sheet which you say you recollect having seen at Calcutta. From his description it is evident that this specimen is a companion to the sheet marked "1278. 1. H.B.C." in Wallich's own herbarium, except that the latter also holds an inflorescence of *Amoora cucullata*. Now this sheet is without a ticket, and has merely the distribution number and H.B.C written in pencil in the left-hand bottom corner. On the other hand there is a label pinned on to a sheet written up in pencil (left-hand bottom corner) "1277 H.B.C." This label, in Wallich's writing, runs, "*Sphaerosacme (Aglaia?) spectabilis*, Wall.—H.B.C., Octob., 1824. E Goalpara introd<sup>a</sup> ab amiciss<sup>o</sup> Hamiltonio, M.D.," and across it, "If Roxburgh's *Andersonia* was tenable this would be a spec. thereof." To which is added in the centre of the label, in pencil, "1277." The plant on this sheet is *Amoora Rohituka*, a plant represented by several sheets in Wallich's herbarium under the name, "*Sphaerosacme polystachya*, Wall., in Herb. 1823."

It is, therefore, not to be assumed that the label beginning, "*Sphaerosacme (Aglaia?) spectabilis*," was intended for the plant with which it is at present associated in the Wallichian herbarium. It was very probably attached to it by accident, and received the number 1277 originally given to *Sphaerosacme polystachya* after it had become attached. But if it was not intended for *Sphaerosacme polystachya*, we can hardly escape the conclusion that it is the missing label of 1278 i. It was written in 1824, 4 or 5 years before the distribution numbers and the preparation of the catalogue. But if we transfer the label to sheet "1278 i.," the specimen which bears at present the label becomes unlabelled. Now there is among the sheets referred to *Sphaerosacme* by Wallich one, and only one, with two field labels. The plant mounted on it is *Amoora Rohituka* and the labels run (a) (left-hand top corner), "Ranna Pitrasa-Goalpara, 8 Sept., 1808," and (b) (right-hand top corner), "Ranna Pitrasa-Rishikund, 8 April, 1811." The specimen itself does not suggest that it is made up of two collections; in fact, the appearance of the several parts of which it consists, and especially the state of preservation, indicates its homogeneity. I am, therefore, inclined to assume that the left-hand corner label (Goalpara) was attached to this sheet by mistake, and was originally connected with the sheet now holding the "*Sphaerosacme spectabilis*" label. This

leaves 1277 C of the Catalogue with the Rishikunda\* label and allows one field label for each of the sheets enumerated in the catalogue, whilst at the same time it makes Wallich's naming consistent. The confusion arose evidently, like many similar cases, when the distribution sets were made up. Sheet "1278, i." is quoted in the catalogue under "*Sphaerosacme Rohituka*, Wall.; *Andersonia Rohituka*, Roxb." This *Sphaerosacme Rohituka*, Wall., is really *Amoora cucullata*, and the quotation is correct as far as the detached large inflorescence of that sheet (left-hand bottom corner) is concerned. Otherwise it represents, as stated above, *Sphaerosacme spectabilis*, Wall. = *Amoora spectabilis*, Miq.

I may add that the tree of *Amoora spectabilis* in the Botanic Garden at Calcutta, from which Wallich took specimens in 1824, was most probably introduced there in 1808 when Hamilton stayed at Goalpara. Wallich's uncertainty as to the Roxburghian species of *Andersonia* is easy to understand. Although they are mentioned already in Hortus Bengalensis, 1811, they were then still undescribed. It was not until 1832 that the descriptions which Roxburgh drew up subsequently were published in Wallich's edition of Roxburgh's Flora Indica.

Whilst writing this note I came across a very fine drawing of *Amoora spectabilis* (*A. Wallichii*), in our collection of drawings. It is no. 351 of a set which was taken over from the East India Museum, and marked on receipt, "Royle, Carey & others." It is written up on the back, "*Sphaerosacme spectabilis*, Wall. *Aglaiia? Milnea?*" and then, written at a later date, "This belongs to Roxburgh's *Andersonia*, which has since been superseded." All this is in Wallich's handwriting. On the front, there is written against 351 "*Sphaerosacme spectabilis*, Wall.," in Royle's hand. There is then no doubt as to what Wallich meant by *Sphaerosacme spectabilis*, namely the plant you are dealing with. Royle helped Wallich with cataloguing, and that may be how he got connected with the drawing, which is most probably one of Wallich's own collection. Unfortunately our list of Wallich's drawings breaks off with no. 208, after which there are only few entries with very much higher numbers (up to 835).

## XXXVII.—JEFFERSONIA AND PLAGIORHEGMA.

J. HUTCHINSON.

In the Genera Plantarum, vol. i. p. 44, Bentham and Hooker united the genera *Jeffersonia*, Bart., and *Plagiorhegma*, Maxim., from the Eastern United States and North-East Asia, respectively. In making this reduction they remark:—

"*Plagiorhegma*, Maxim. Prim. Fl. Amur. 34, t. 1, † species Mantchuriensis, ex habitu et fructu certe *Jeffersoniae diphyllae* congener videtur. Flores adhuc ignoti, illi enim quos auctor dilapsos invenit descriptsitque, ipso fatente abnormes erant."

\* Rendered Rohilkund in the catalogue which is clearly an error. Hamilton was in Monghyr in 1811, and Rishikunda is near Monghyr.

† Should be tab. II.

It is true that Maximowicz had only a fruiting specimen before him when he described *Plagiorhegma*, and, in failing to discover any trace of stamens, he came to the erroneous conclusion that the flowers were unisexual. But I can see no reason for the statement that the flowers were abnormal. Maximowicz's figure is an excellent one and depicts *P. dubia* just like his type specimen, and as the plant grows in the Rock Garden at Kew. Subsequently flowering specimens were gathered in North-East China by John Ross, and were received at Kew in 1877, an additional specimen being received from the Petrograd herbarium in 1910. On dissecting these I find good differences in the flowers, as well as in the leaves and fruits as noted by Maximowicz. These differences are shown in the following table:—

**Jeffersonia, Bart.**

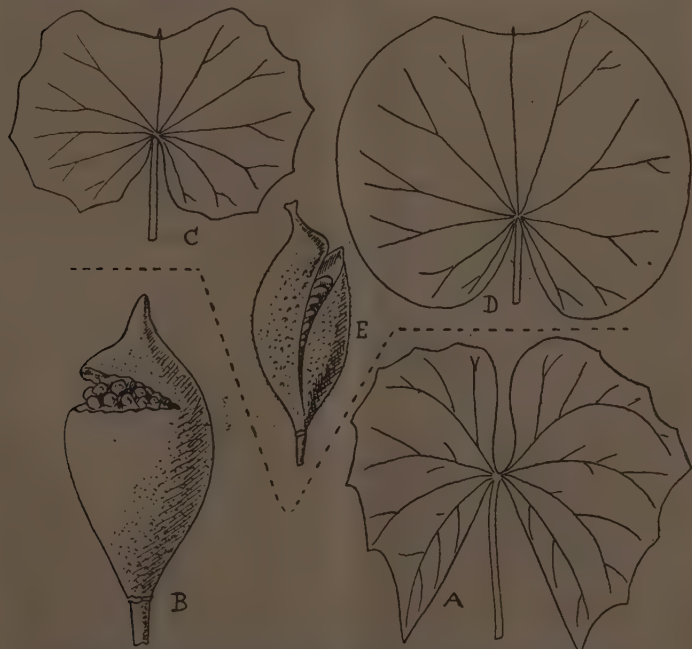
Leaves bifoliolate (fig. A). Sepals 4. Petals 8. Stamens 8. Capsule (fig. B) opening by a horizontal slit near the apex (half circumscissile).

Native of the Atlantic States of North America, in woods, Eastern Pennsylvania, New York and Ontario to Wisconsin, Iowa, Virginia and Tennessee, ascending to 2500 ft. in Virginia.

**Plagiorhegma, Maxim.**

Leaves unifoliolate (figs. C. and D). Sepals 3. Petals 6. Stamens 6. Capsule (fig. E) opening by an oblique and almost vertical slit extending from near the style to almost the base of the capsule.

Native of North-Eastern Asia, from Shengking Province (China) and Corea to the Amur River.



A and B, leaf and fruit of *Jeffersonia diphylla*; C, D, E, leaves and fruit of *Plagiorhegma dubia*.



These three important differences in the leaves, flowers and fruits, coupled with the separate geographical distribution, seem quite adequate for the re-establishment of *Plagiorhegma* as a valid genus. Benthams and Hooker no doubt paid little attention to the difference in the distribution because of the analogous cases in other genera of *Berberidaceae*,\* some of which show a close relationship and ancient connection between the floras of North-Eastern Asia and North America, especially Atlantic North America. The following genera or species of *Berberidaceae* are common to these two areas:—

**Podophyllum** (*P. peltatum* in Canada and E. Un. States; five species in China and Himalaya).

**Diphylleia** (*D. cymosa*, high altitudes, Virginia to Georgia and Tennessee, and in Central and Western China; *D. Grayi* in Japan).

**Achyls** (Pacific N. Amer. and Japan; 2 very closely allied species, *A. triphylla*, DC., and *A. japonica*, Maxim., respectively).

**Caulophyllum** (*C. thalictroides*, Atlantic N. Amer. and N.E. Asia and Central China).

I give below a revised description of the genus and single species of *Plagiorhegma*.

**Plagiorhegma**, Maxim. Prim. Fl. Amur. 34, t. 2 (1859); descr. emend.

*Herba* polycephala, rhizomate perenni tenui suberecto foliorum basibus vaginantibus membranaceis costatis persistentibus induto. *Folia* radicalia, unifoliolata, longe petiolata, apice leviter et late biloba, basi cordata, palminervia. *Scapus* nudus, uniflorus. *Sepala* 3, petaloidea, mox decidua. *Petala* 6, plana, sepalis multo majora. *Stamina* 6, libera; antherae extrorsae, valvulis 2 sursum dehiscentibus. *Ovarium* sessile, stylo brevissimo crasso in stigma cupularem undulate lobatum dilatato; ovula numerosa, ad ventrem circiter 5–6-seriata, adscendentia, anatropa. *Capsula* parva, coriacea, ab apice fere usque ad basin oblique dehiscens. *Semina* breviter arillata, arillo carnosio demum lacerato.

**P. dubia**, Maxim. l.c.

*Jeffersonia dubia*, Benth. et Hook. f. ex Baker et Moore in Journ. Linn. Soc. xvii. 377 (1879); Gard. Chron. lxiii. 149, fig. 68 (1918). *J. manchuriensis*, Hance in Journ. Bot. ix. 258 (1880).

*Herba* perennis fructifera usque ad 30 cm. alta; rhizoma tenue, suberectum, radicalibus fibrosis numerosis instructum, foliorum basibus vaginantibus membranaceis arcte indutum. *Folia* numerosa, longe petiolata, subreniformia, basi cordata, apice late bilobata, subanthesi circiter 3 cm. diametro et marginibus undulato-lobulata, maturitate multo majora et fere integra (minute denticulata), usque ad 10 cm. diametro, palmatim 9–10-nervia, nervis utrinque conspicuis multiramosis; petioli straminei, sulcati, glabri. *Pedunculi* floriferi 9–12 cm. longi,

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\* Excluding *Lardizabalaceae*, a distinct family included by Benthams and Hooker in the *Berberidaceae*.

fructiferi usque ad 20 cm. longi, sulcati, glabri. *Sepala* 3, petaloidea, mox decidua, oblongo-lanceolata, subobtusata, circiter 6.5 mm. longa, striata, glabra. *Petala* 6, obovata, 1 cm. longa, 6 mm. lata, ad basin angustata. *Stamina* 6, ovario aequilonga; filamenta complanata, 2 mm. longa; antherae 4 mm. longae. *Ovarium* 4 mm. longum, glabrum; stylus crassus, fere 2 mm. longus, in stigma cupularem undulate lobatum expanso. *Capsula* 1.4 cm. longa, carnosa, extra rugulosa, stylo persistente 3 mm. longo coronata. *Semina* brunnea, obovoidea, 3 mm. longa.

Manchuria: Lower Amur River, in pine forests near Pachale, fr., *Maximowicz*; near Vladivostok, fls., *Palczewsky* in *Herb. Komarov* 734. Corea: Chemulpo, fr., *Charles* 68. Shengking Province: shady wood, Fungshan, fls., *Ross* 29; wooded valleys, Corean Gate, fr., *Ross*. Mukden to Yaloo River, near Laoling, fls., *Webster* 136.

Vernacular name in Manchuria, *Kámbalta*.

Hance (see above) proposed the new name *manchuriensis* for *dubia*, because of the latter's unsuitability; a course, however, which we are unable to follow. For such a trivial reason the changing of specific names would have no end.

## XXXVIII.—DECADES KEWENSES

PLANTARUM NOVARUM IN HERBARIO HORTI REGII  
CONSERVATARUM.

### DECAS XCIX.

981. *Xanthophyllum Burkilli*, *Drummond et Dunn* [Polygalaceae]; e speciebus adhuc cognitis vix ulli arcte affinis, floris magnitudine et structura ad *A. Schortechini*, King, aliquanto approximata ab ea ob filamenta pilosa, ovarium vix longe-stipitatum, folia chartacea aliasque notas facile distincta.

*Arbor* modicae altitudinis, ramis irregulariter flexuosis, cortice cinereo-albido. *Folia* lanceolata, ovato-oblonga vel elliptica, basi cuneata vel subrotundata, versus apicem subito acuminata, apice subobtusata, basi obscure quinquenervia, omnino glabra, superne virentia, subtus glaucescentia, duobus nervis marginalibus marginem subcrassam formantibus, lateralibus ad decem intra marginem anastomosantibus conspicuis pallidis, petiolis coloratis circa 7 mm. longis suffulta. *Flores* usque ad 1.6 cm. longi, in racemos cernuos circa 3.5 cm. longos paniculatum confertos dispositi; pedicelli puberuli, bracteolis cymbiformibus basalibus apice villosis circa 1.5 mm. longis muniti. *Sepala* 5, imbricata, inaequalia, pubescentia, posticum quam alia conspicue majus. *Petala* 5, omnia fere longitudine aequalia, sepalis 3-plo longiora, vix unguiculata, dorso carinata, carina versus basin angustata. *Filamenta* basi dilatata, pilosa, duo cum alis inferne connata, tertia petalo superiore plus minus adhaerens, caetera libera, stamina ad basin connectivi pilis satis longis ornata. *Discus* patelliformis, margine crenato. *Ovarium* distincte stipitatum, obverse turbinatum, sericeo-pubescent; stylus circa 3 mm. longus, subulatus, pilis sericeis instructus; stigma capitatum;

ovula ad octo, per duo series erecta, dissepimento incompleto imperfecte divisa.

EASTERN HIMALAYA. Outer Abor Hills, Pasighat. *Burkill* 36767, 36864. The flowers appear to have been of a pale yellow or cream colour, deepening to gold brown on their backs and also on the sepals. Mr. Burkill notes "tree with young pendent lilac-flushed leaves." The species represents a new type in the genus of which it is at present the most northerly known representative. Two undescribed species collected by Lace in Burma (Lace 4756 and 4771) are allied, but the material is unfortunately insufficient for determination.

982. *Impatiens Beccarii*, *Hook. f. MS.* [Geraniaceae-Balsamineae]; *I. latifoliae*, *Hook. f. et Thoms.*, affinis, sed floribus minoribus, alis dorso vix auriculatis, calcare incurvo distincta.

*Herba* erecta, glabra, 30 cm. alta; caulis simplex superne foliosus. *Folia* alterna, lanceolata, apice acuminata, basi acuta, 8-10 cm. longa, 3-4 cm. lata, serrata, subtus pallidiora, nervis 7-8-paribus; petioli 2-4 cm. longi. *Pedunculi* ex axillis superioribus 2-4-flori, 6-10 cm. longi; pedicelli 1-2 cm. longi, bracteis parvis lanceolatis basi suffulti. *Flores* calcare incluso 3-4 cm. longi, rosei. *Sepala* 2 lateralia ovata, acuminata, 6 mm. longa, 5-nervia, tenuia; posticum ex ore cymbiformi acuminato 1 cm. lato in calcar tenue semicirculare 2 cm. longum abiens. *Verillum* orbiculare, ad 2 cm. diametro; costa breviter carinata. *Alae* 2 cm. longae, basi subito attenuatae; lobus basalis oblongus, distalis rotundatus, auricula dorsalis nulla. *Capsula* glabra, turgida, 1 cm. longa.

W. SUMATRA. Province of Padang: Ajer mantjoer; 300 m., Aug. 1878, *Beccari*; Singubong, 2140 m., June 1903, *Micholitz*.

983. *Ixora monticola*, *Gamble* [Rubiaceae-Ixoreae]; species verosimiliter humilis, foliis parvis et cymis sessilibus insignis.

*Frutex* erectus, humilis, ramulis brunneis ultimis minute furfuraceo-puberulis. *Folia* tenuiter coriacea, lanceolata vel oblanceolata, apice acuminata, mucronata, basi attenuata, supra lucida, glabra, infra juventute puberula, deinde glabra, 4-8 cm. longa, 1.5-3 cm. lata; nervi utrinque 8-10, primum recti, denique curvati et arcuatim prope marginem juncti; petiolus gracilis, 5-8 mm. longus; stipulae ovatae, apiculo subulato munitae. *Cymae* sessiles, bracteis basalibus lanceolatis circiter 7 mm. longis; ramorum trium pedunculi circiter 1-1.2 cm. longi, in corymbum parvum multiflorum desinentes; corymbi 3 mm. diametro bracteolis multis linearibus muniti. *Calycis* *tubus* et lobi aequales circiter 1 mm. longi, furfuraceo-puberuli. *Corollae* *tubus* gracilis, 7 mm. longus; lobi breves, recurvi, minute puberuli, vix 2 mm. longi. *Stamina* reflexa, filamentis brevibus, antheris sagittatis. *Stylus* gracilis, glaber, exsertus, stigmatibus 2 patentibus. *Fructus* globosus, glaber, 5 mm. diametro, calycis lobis persistentibus coronatus.

SOUTH INDIA. "High Wavy Mountain" near Cumbum, Madura District, at 300-1200 m. alt., May 1917, *Blatter and Hallberg*, 25, 254, 966 (in *Herb. Calcutt.*).



984. *Ixora Lawsoni*, Gamble [Rubiaceae-Ixoreae]; species distincta, calycis lobis linearibus ciliatis et cymis corymbosis maxime congestis fere capitula formantibus insignis.

*Arbor* vel frutex elatus, ramulis validis nodosis ultimis pubescentibus fere complanatis. *Folia* coriacea, glabra, ovata, elliptica vel oblongo-lanceolata, apice acuta et mucronata, basi rotundata, juniora aliquando attenuata, 8–16 cm. longa, 3–6 cm. lata; nervi laterales fere horizontales, utrinque 10–16, primum recti, deinde curvati et prope marginem arcuatim juncti, supra impressi; petiolus brevis, vix 5 mm. longus vel nullus, crassus; stipulae ovatae, apiculo dorsali longo subulato. *Cymae* terminales, corymbosae, maxime congestae, vix 4 cm. latae; pedunculus 0–5 cm. longus, bracteis ovatis foliaceis munitus; bracteolae permultae, lineares, conspicue ciliatae, 4–5 mm. longae, duae ultimae ad basim ovarii oppositae. *Calycis* *tubus* glaber, brevis; lobi 4, lineares, ciliati, additis aliquando 1–2 intermediis brevioribus, 4 mm. longi, persistentes. *Corollae* *tubus* cylindricus, gracilis, glaber, 8–13 mm. longus; lobi 4, ovato-oblongi, apice curvati, acuti, circiter 4 mm. longi, erecti vel patentes, fauce glabri. *Stamina* recurva, filamentis brevibus, antheris linearibus. *Stylus* gracilis, glaber, stigmatibus 2 gracilibus. *Fructus* globosus vel didymus, siccitate niger, glaber, ad 1 cm. latus, 6 mm. altus; pyrenae crustaceae. *Semina* peltata, excavata; embryo curvatus, 5 mm. longus, cotyledonibus cordatis foliaceis, radícula longa crassa infera.

SOUTH INDIA. Coorg, Wight in Herb. Kew. Manantoddy, Wynaad, Malabar, about 1000 m. alt., Jan. 1884, *M. A. Lawson* 43. There is no indication on the sheets of this distinct species to show its size, but from the specimens it would seem to be a small tree. The colour of the corolla is not given.

985. *Ixora Saulierei*, Gamble [Rubiaceae-Ixoreae]; *I. Lawsoni*, Gamble, affinis, calycis lobis brevioribus sparse hirsutis, bracteolis filiformibus, inflorescentia haud congesta differt.

*Arbor* parva vel frutex, ramulis griseis scabris ultimis pubescentibus fere complanatis. *Folia* coriacea, elliptica vel elliptico-ovata, siccitate grisea, apice acuta, basi attenuata, supra glabra, subtus scabride pubescentia, 10–15 cm. longa, 4–6 cm. lata; nervi laterales angulo ad circiter 60° costam relinquentes, utrinque 10–15, marginem versus arcuatim juncti, reticulatione irregulari; petiolus brevis, crassus, 5 mm. longus; stipulae ovatae, scabrae, longe acuminatae. *Cymae* terminales, breviter (circiter 1 cm.) pedunculatae, bracteis 2 foliaceis 1 cm. longis ornatae; ramuli 3, conspicue complanati, pubescentes, corymbis parvis paullo congestis praediti; bracteolae filiformes, 2–3 mm. longae, hirsutae. *Calycis* *tubus* brevis, hirsutus; lobi lineari-lanceolati, hirsuti, 2.5 mm. longi, marginibus incurvis, persistentes. *Corollae* *tubus* cylindricus, gracilis, glaber, 1–1.5 cm. longus; lobi 4, oblongi, acuti, 4 mm. longi, reflexi, fauce glabri. *Stamina* recurva, filamentis brevibus, antheris linearibus mucronatis. *Stylus* gracilis, glaber, ramis stigmatosis 2 patentibus. *Fructus* didymus, sicci-

tate niger, glaber, 8 mm. diametro; pyrenae crustaceae. *Semina* peltata, excavata; embryo curvatus, cotyledonibus foliaceis.

SOUTH INDIA. Pulney hills, *Revd. A. Saulière*, 637, 684.

986. *Coffea crassifolia*, *Gamble* [Rubiaceae-Ixoreae]; sectionis *Lachnostoma*, species *C. Khasianae*, Hook. f., affinis sed ramulis et foliis crassioribus, fructu ellipsoideo differt.

*Frutex* erectus, ramulis crassis, ultimis pallidis subtetragonis. *Folia* coriacea, elliptica, apice abrupte acuta, basi paullo attenuata, glabra, supra lucida, 8-10 cm. longa, 3-5 mm. lata; nervi utrinque 5-6, curvati et reticulatione siccitate prominente juncti; petiolus crassus, 5-10 mm. longus; stipulae triangulares, acuminatae, glabrae. *Flores* minimi, in cymis parvis axillaribus brevibus; pedunculus circiter 3 mm. longus; bractae et bracteolae minimae, calyculum formantes. *Calycis* limbus brevis, truncatus, vix dentatus. *Corollae* tubus brevis, 2-3 mm. longus, intus villosus; lobi 4, oblongi, 2 mm. longi. *Fructus* ellipsoideus, glaber, 7-8 mm. longus, calycis tubo persistente coronatus. *Semina* 2, dorso convexa, intus paullo concava, utrinque rugosa, embryo minimo.

SOUTH INDIA. Ayerpadi, Anamalai Hills, April 26, 1903, *C. A. Barber* 5474; Peermade, in Travancore, at 1500 m., Dec. 1910, *A. Meebold* 12860.

987. *Morinda reticulata*, *Gamble* [Rubiaceae-Morindeae]; *M. umbellatae*, Linn., affinis, calycis limbo carnosio conspicuo foliis coriaceis glabris lucidis et foliorum nervatione reticulata differt.

*Frutex* scandens, ramulis teretibus pallidis. *Folia* coriacea, glabra, lucida, oblanceolata vel lineari-oblonga, apice abrupte caudato-acuminata, basi attenuata, 8-16 cm. longa, 2-4 cm. lata; nervi laterales utrinque 10-12, paralleli, angulo circiter 60° costam relinquentes, deinde ad marginem curvati et nervis secundariis et reticulatione conspicuis juncti; petiolus 5-10 mm. longus; stipulae intrapetiolares tubum cylindricum pallidum formantes. *Florum capitula* terminalia, umbellata, pedunculis circiter 5 ad 1 cm. longis. *Calycis* tubus crassus, carnosus; limbus conspicuus, paullo elongatus, pulvini annulati ad instar, lobis 0. *Corollae* tubus brevis, intus villosus; lobi etiam breves, crassi. *Stamina* 4, ovata, inclusa, filamentis brevibus. *Ovarium* crassum, 4-loculare, ovulis 4; stylus brevis, lobis stigmatosis 2 rotundatis. *Syncarpium* carnosum, globosum, circiter 1.5 cm. diametro, e baccis inverse pyramidalis, pyrenis 4 cuneiformibus osseis triquetris. *Semina* oblonga, albumine carnosio, cotyledonibus minimis ovatis, radícula longa inferiori.

SOUTH INDIA. Evergreen forests of Travancore, at Merchiston, 600 m. alt., April, 1895, *Bourdillon* 591; at Kulathurpolay, June, 1913, *M. Rama Row*, 1281.

988. *Psychotria Barberi*, *Gamble* [Rubiaceae-Psychotriace]; pyrenis quadrisulcatis, foliis membranaceis siccitate nigris late obovatis longe petiolatis insignis.

*Frutex* erectus, ramulis teretibus pallidis. *Folia* late obovata, apice rotundata, apiculo brevi acuto, basi cuneata, chartacea, glabra, 12–16 cm. longa, 5–9 cm. lata; nervi paralleli, utrinque circiter 15, primum recti, marginem versus curvati et arcuatim juncti; nervuli transversi, irregulares, distantes; petiolus crassus, 1.5–2 cm. longus; stipulae cylindratae, truncatae vel fissae, extus rufo-pubescentes. *Cymae* terminales, breviter pedunculatae, brachiatae, rufo-pubescentes, fructiferae ad 9 cm. longae, 12 cm. latae; bracteae et bracteolae deciduae, minimae. *Calycis tubus* brevis, pubescens; lobi 5, lanceolati, patentes, acuminati. *Corollae tubus* 3–4 mm. longus, intus albo-villosus; lobi 1–1.5 mm. longi. *Antherae* inclusae, breves, filamentis subnullis. *Fructus* ellipsoideus, fere 1 cm. longus, siccitate niger; pyrenae dorso 4-sulcatae. *Semina* pyrenis conformia, sulcata, rugosa; cotyledones parvi, ovati; radícula inferior, crassa.

SOUTH INDIA. Anamalai Hills, Coimbatore, at Udamanparai, May 15, 1903, C. A. Barber 5906. Travancore, at Pisga Camp near Munaar, 1500 m. alt., May 10, 1915, K. Venkoba Row.

989. ***Psychotria globicephala*, Gamble** [Rubiaceae-Psychotriaceae]; *P. Thwaitesii*, Hook. f., affinis, floribus in capitulo globoso aggregatis, calycis lobis late obovatis ciliatis, foliis angustioribus tenuioribus nervis plurimis inconspicuis differt.

*Frutex* erectus, ramulis teretibus pallidis glabris. *Folia* chartacea, oblongo-oblancoolata, apice abrupte acuta, basi attenuata in petiolum decurrentia, supra glabra, subtus juniora solum appresse puberula, 10–17 cm. longa, 3–5 cm. lata; nervi utrinque 12–18, haud conspicui, curvati et arcuatim inter se et cum nervis intermediis et nervo marginali juncti; petiolus crassus, circiter 1 cm. longus; stipulae late ovatae, acumine subulato et intus pilis rufis ornatae, cito deciduae. *Flores* parvi, in capitulo pedunculato globoso circiter 1–1.5 cm. lato aggregati; pedunculus 1–2.5 cm. longus, crassus; bracteae stipuliformes, crassae; bracteolae parvae, obtusae, deciduae, cum pilis multis rufis persistentibus mixtae. *Calycis tubus* brevis, campanulatus; lobi conspicui, late obovati, obtusi, ciliati, 2–3 mm. diametro. *Corollae tubus* cylindricus, latus, 3–4 mm. longus, intus villosus; lobi 1–2 mm. longi, reflexi. *Stamina* paullo exserta, antheris oblongis. *Stylus* vix exsertus, lobis stigmatosis obtusis. *Fructus* ignotus.—*P. Thwaitesii*, var. *peninsularis*, Hook. f. Fl. Brit. Ind. iii. 162, in part.

SOUTH INDIA. Courtallum in Tinnevely, August, 1835, Wight (Kew Distrib. 1440).

990. ***Lasianthus cinereus*, Gamble** [Rubiaceae-Psychotriaceae]; *L. dichotomo*, Wight, affinis, ramulis cinereis, foliis paucinerviis et pedunculis brevioribus differt.

*Frutex* erectus, ramulis cinereis appresse pubescentibus elongatis. *Folia* subcoriacea, elliptico-lanceolata vel oblongo-lanceolata, apice caudato-acuminata, mucronata, basi attenuata vel subobtusa, supra glabra, subtus praecipue ad nervos appresse pubescentia, 7–10 cm. longa, 2–3 cm. lata; nervi utrinque 3–4 cito



curvati, deinde apicem versus producti; nervuli transversi numerosi, prominentes, paralleli; petiolus 3-5 mm. longus, tortus; stipulae triangulares, cinereo-villosae, circiter 4 mm. longae. *Cymae* axillares, dichotomae, cinereo-villosae, pauciflorae, 1 cm. longae; pedunculus 5 mm. longus, aliquando brevior; bracteolae lineares, longissimae. *Calycis* *tubus* brevis; lobi 4, lanceolati, 4 mm. longi, appresse villosi, apice setosi. *Corollae* *tubus* brevis; lobi oblongi, utrinque villosi. *Fructus* glaber, apice depressus, 4 mm. diametro, siccitate niger.

SOUTH INDIA. Kalivayalpil, Tinnevely, May 31, 1901, C. A. Barber 3014; Kannikatti, Tinnevely, June 9, 1899, *ib.* 454; near Naterikal, Travancore boundary, March 4, 1917, K. Rangachari 1450.

### XXXIX.—MISCELLANEOUS NOTES.

JOHN CHISNALL MOORE.—We record with regret the death of Mr. J. C. Moore, late Superintendent of Agriculture, Grenada, on May 5th, at Old Woodstock, Oxon.

Mr. Moore entered the Royal Botanic Gardens, Kew, in December, 1893, and left in June, 1895, on his appointment to the Curatorship of the Botanic Station, St. Lucia (*K.B.* 1895, p. 155). In the year 1898 he was made Agricultural Superintendent of that island, when the Agricultural Department was re-organised. He held the post until 1914, when he was transferred to Grenada as Superintendent of Agriculture (*K.B.* 1914, p. 345), and owing to failing health he retired on pension in 1919 (*K.B.* 1919, p. 447). Mr. Moore had only recently returned to enjoy his retirement in England.

*Sapindus trifoliata*, Linn. or *S. laurifolia*, Vahl.—It has been observed that the former name, which was used by Hiern in the Flora of British India, vol. i. p. 682, has been superseded in Trimen's Handbook of the Flora of Ceylon, in Cooke's Flora of the Presidency of Bombay, and in other works, by *S. laurifolia*, Vahl, and an attempt has been made to ascertain whether there is any good reason for the change.

Vahl himself treated *S. trifoliata* as a synonym of his *S. laurifolia*, adding in a note: "Cur trifoliatam auctores hanc dixerint, facile non liquet, cum folia pinnata uti ex figura descriptione Rheedii apparet l.c.; nomen triviale igitur utpote quam maxime incongruum mutavi." Trimen (*Handb. Fl. Ceyl.* i. 306), adopting Vahl's name, says: "Hiern in *Fl. Brit. Ind.* gives the name *S. trifoliata*, L., to this [*S. laurifolia*] and the next [*S. emarginata*] combined. The name is an absurd one, as neither plant is trifoliolate. Moreover, the plant so called by Linnaeus is the 'Conghas' of Hermann, which, as above noticed, is *Schleichera trijuga*. Linnaeus afterwards added a quotation of Rheede's figure, and hence his name has got transferred to the present species; but it should not be maintained." Under *Schleichera trijuga* (l.c. p. 304) Trimen again states that it is the

'Conghas' of Hermann and quotes Herm. Hort. Lugd.-Bat. 536, Herm. Mus. 69, Burm. Thes. 209 and Linn. Fl. Zeyl. n. 603.

Now what are the facts? In Flora Zeylanica, p. 231, Linnaeus includes "Conghas" among his "Barbarae. Annihilatae," and writes "Conghas Herm. Zeyl. 69. *Saponaria arbor zeylanica trifolia, semine lupini*. Herm. mus. 69, prodr. 373, Burm. Zeyl. 209," etc. Subsequently, in Species Plantarum, ed. i. 367, against *Sapindus trifoliata*, he writes, "*Sapindus foliis ternatis*," and quotes Rheede's Hortus Malabaricus, iv. p. 43, t. 1 only, not at all referring to Flora Zeylanica. So far then there is nothing to show that he meant the same plant in the two cases.

Linnaeus quotes no number of Hermann's Herbarium as he does in other cases where he describes and names a plant in that Herbarium. Nor is there a specimen of "Conghas" in Hermann's Herbarium, or one of *Saponaria* . . . *trifolia* in Linnaeus'. Hermann himself, as Dr. Rendle kindly pointed out to me, included "Conghas" among his species not properly known, and all he says about it is: "*Saponaria arbor Zeylanica trifolia semine lupini. Conghas Zeylanens. Saponaria Sphaerulae arbor Lugd. Nuculae Saponariae non edules. C.B.P.*" This as far as it goes applies as well to *Sapindus* as to *Schleichera*, or even better.

In the case of Burmann's "Conghas" the evidence available is less ambiguous. This is what Burmann (Thes. Zeyl. 209) says:—"SAPONARIA arbor, Zeylanica, trifolia, semine Lupini. Par. Bat. Pr. pag. 373. Mus. Zeyl. pag. 69. *Saponaria arbor, trifoliata, Zeylanica. H. Beaum. pag. 37. Saponaria arbor, Indica. Amm. H. Bosian. pag. 32. Saponaria arbor trifolia, Indica, H. L. Bat. pag. 536. & Commel. Fl. Malab. pag. 60. ubi jungitur cum Prunifera fructu racemoso, parvo, nucleo saponario. Ray hist. pl. pag. 1548, huc spectat Purinsji H. Malab. part. 4 Tab. 19. ubi pag. 44. in notis vide varios fructus, quibus Indi saponis loco utuntur. an Arbor Prunifera, sphaerulas saponarias ferens, tetraphylla, ex India Orientali. Plukn. Phyt. Tab. 14. Fig. 6? & Almag. pag. 47. CONGHAS nostra Zeylonensibus dicitur."*

All the references additional to Hermann's point rather to *Sapindus* than *Schleichera*. In support of that it may be added that Commelin calls the tree "Seepnoten," whilst Ray not only refers to it as the "Soap Tree," but also gives a description of the flowers which leaves no doubt that he is dealing with a *Sapindus* and not with a *Schleichera*. Burmann also quotes the Purinsji of Rheede (H. Malab. iv. t. 19). This, however, is the basis of the *Sapindus trifoliatus* of Linnaeus, who evidently knew it only from that source there being no specimen in his herbarium. This figure of Rheede's is good, and considered in conjunction with his description there is no doubt that it represents Vahl's *Sapindus laurifolia*.

The "Conghas" of Hermann is therefore, presumably, and that of Burmann, certainly, a *Sapindus*, and both are probably identical and correspond to *Sapindus trifoliatus*, Linn., or the synonymous *Sapindus laurifolius*.

As regards the unsuitability of the name "*trifoliatus*," this cannot prevent its being used, and it is after all no less suitable

than many other names admitted; one leaf in Rheede's figure is trifoliolate, and on the other hand "trifoliata" may refer to the frequent occurrence of three pairs of leaflets; moreover, seedlings have actually ternate leaflets. Lastly, *Schleichera* is no more trifoliolate than is *Sapindus*.

It is a point of interest, not that it affects the argument, that Radlkofer, who paid special attention to the *Sapindaceae*, also refers to *S. trifoliata* as a synonym for *S. laurifolia*. I think therefore that the name *Sapindus trifoliata* should be restored in systematic works in the place of *S. laurifolia*.

H. H. HAINES.

**Sesbania sericea as a green manure crop.**—We have received the following letter from Mr. J. Sydney Dash, Director of the Agricultural Station, Guadeloupe, West Indies:—

"I am forwarding you specimens of a leguminous plant which I found growing wild on an islet in the harbour of this town, and which I have under experimental cultivation as a possible green-manure crop. The nodules which form on the roots are, in size and quantity, superior to those of any other leguminous plant with which I am acquainted. It seems to be capable of reaching a height of four feet or more in good moist soil. At this stage, of course, it has a tendency to become woody. If employed as a green manure crop it would be well to turn it in before it gets too old. Sown thickly, it will produce a heavy yield of green material when two to two-and-a-half feet high. At this time an analysis of the plant was made in our laboratory, and I enclose a copy of the results, from which you will see that the nitrogen content is very high."

			Stems.	Roots.
Moisture	...	...	69.17	
*Albuminoids	...	...	3.69	
†Amides	...	...	1.39	
Mucilage	...	...	3.50	
Cellulose	...	...	5.80	
Woody fibre	...	...	14.27	
†Ash	...	...	2.18	
			100.00	
*Containing nitrogen	...	...	0.59	
†	...	...	0.25	
*†Total nitrogen	...	...	0.84	0.83
†Containing phosphoric anhydride	...	...		
(P <sub>2</sub> O <sub>5</sub> )	...	...	0.24	0.29
†potassium oxide (K <sub>2</sub> O)	...	...	0.20	0.20
Kilos per hectare.				
		N.	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Stems	14,103	118	34	28
Roots	1,710	14	5	3.5
Totals	15,813	132	39	31.5



The plant proves to be *Sesbania sericea*, DC., a leguminous herb characterised by silky leaflets and straight very narrow pods. In the Herbarium there are specimens from the following places: West Indies: Porto Rico; sea shore at Mayaguez (*Sintenis* 61); moist fields near Anasco (*Sintenis* 5594). Jamaica; on the road from Kingston to Spanish Town (*Harris* 9051). Bahamas; near Nassau (*A. H. Curtiss* 160). British Guiana: sea shore (*Jenman* 4538). French Guiana: Cayenne (*Sagot*). According to Urban (*Symb. Antill.* iv. 286) it occurs also in Hispaniola, St. Thomas, Antigua, and Martinique. A single gathering has also been made in Ceylon, near Colombo (*Ferguson*).



A, portion of *Sesbania sericea*,  $\frac{2}{3}$  nat. size; B, C, D, standard, wing, and keel petals, respectively, enlarged; E, infructescence,  $\frac{2}{3}$  nat. size; F, fruit laid open; G, seed; enlarged.

There is besides, on the West Coast of Africa, what appears to be almost an identical species named by De Candolle *Sesbania pubescens*. It occurs in marshy places from Senegambia to Lake Chad, and on the shores of the island of St. Thomas. Should *S. sericea* prove useful as a green manure in the West Indies, no doubt *S. pubescens* would serve the same purpose in Africa.

In Western Australia there is also a plant which scarcely seems

specifically distinct from *S. sericea*, named by Bentham in the *Flora Australiensis* (ii. 213) *S. aculeata*, Pers., var. *sericea*. It is recorded from Flinders River (coll?), Sturts Creek (von Mueller). Depuch Islands (*Bynoe*), and between the Ashburton and De Gray Rivers (*Clement*).

The accompanying text figure of *Sesbania sericea* should give cultivators some idea of the appearance of the plant. J. H.

**New Zealand Plants and their Story, L. Cockayne.**—The second edition (1919) of this well-printed and well-illustrated book, published as Manual No. 1 by the New Zealand Board of Science and Art, is virtually a new work. It presents a connected account of the vegetation of New Zealand and must form an indispensable complement to Cheeseman's "Manual of the New Zealand Flora" for a botanist studying the vegetation of the progressive Dominion. There are 99 photographic reproductions in addition to text-figures.

The vegetation is chiefly considered from ecological and phytogeographical standpoints. The first chapter deals with the history of botanical exploration in New Zealand, and the only prominent name we miss is that of Dr. Cockayne himself. A second chapter forms an introduction to the ecology of the country and contains a clear exposition of the commoner terms used in its study and a suggestive classification of growth-forms. Following chapters deal with the flora of the sea-coast, forests, lowland, heath and rock vegetation, plants of inland waters, swamps and bogs and the flora and vegetation of the outlying islands. A chapter entitled "The evolution of a new flora and vegetation," records the influence of man and his domesticated animals on the vegetation, and another gives in outline a classification of New Zealand plants, carefully explaining the principles on which it is based. The penultimate chapter deals with the distribution of the plants in New Zealand, and includes a brief account of each of the 15 botanical districts into which the author has proposed to subdivide the country. The final chapter, dealing with the affinities, origin, and history of the flora is, perhaps, the most interesting in the book. It is pointed out that New Zealand species fall, according to their origin and affinities, into one of the six following groups: endemic, Australian, Fuegian, Malayan, European, cosmopolitan. Of the estimated 1780 species of Vascular Plants constituting the flora 74 per cent. are endemic, while of the dicotyledons and conifers 85 per cent. are endemic. 290 species are common to New Zealand and Australia and 23 species to New Zealand and Fuegia, while about 20 other New Zealand plants have very closely related forms in Fuegia. The Malayan element, except in Vascular Cryptogams, makes itself felt in the joint possession of certain genera rather than of species. The European element is small and the cosmopolitan chiefly tropical and subtropical. In summarising the evidence the view taken is that New Zealand possessed a primitive flora of her own—the Palaeozelandic—which probably formed part of that of a wide

land-area, perhaps united to Antarctica; that at an early date the ancestors of the present subantarctic element came in; that later there was an invasion of tropical Malayan species, and perhaps also of the Australian element. W. B. T.

**Botanical Magazine.**—The following plants were figured in the number for October, November and December, 1919:—*Baikiaea insignis*, Benth. (t. 8819), from Tropical West Africa; *Atraphaxis Billardieri*, Jaub. et Spach (t. 8820), a native of Greece and the Levant; *Primula spicata*, Franch. (t. 8821), from Western Yunnan; *Cotyledon oppositifolia*, Ledeb. ex Nordm. (t. 8822), from the Caucasus; *Euonymus alatus*, Regel (t. 8823), a native of North-Eastern Asia; *Thorncroftia longiflora*, N. E. Brown (t. 8824), a native of the Transvaal; *Sigmatostalix costaricensis*, Rolfe (t. 8825), from Costa Rica; *Rosa glutinosa*, Sibth. et Sm. var. *dalmatica*, Borbas (t. 8826) from Dalmatia; *Campanula sulphurea*, Boiss. (t. 8827), a native of the Orient; *Haworthia Chalwini*, Marloth et Berger (t. 8828), from South Africa; and *Gaultheria cuneata*, Bean (t. 8829), a native of Western Szechuan. The volume for the year is dedicated to Mr. E. H. Wilson, V.M.H., Assistant Director of the Arnold Arboretum, "Whose ardour as an Explorer and judgment as a Collector have added to our Gardens many Eastern Asiatic plants whose portraits embellish the Botanical Magazine."

**The Dwarf Coconut.**—The following note is extracted from an article on "The Dwarf Coconut," by Mr. W. P. Handover, in the Agricultural Bulletin of the Federated Malay States, No. 5, 1919, pp. 295-297. "The dwarf coconut known in this country as 'nyiur gading' is remarkable for its early fruiting, palms only 10 ft. high bearing abundant fruits touching the ground. The young palm grown under good conditions starts to flower in its third year and produces ripe fruit in about nine months from the appearance of the flower spike. The initial flower spikes contain only male flowers, but other spikes appearing in rapid succession are larger and bear an increasing number of female flowers also, a spike from a six year old tree being counted with 200 young female flowers, whilst trusses of fruit from similar trees have been found with as many as 55 ripe nuts. It is generally of a bright yellow colour, and Winstedt in his quotations from Malayan Folk Lore speaks of 'nyiur gading,' the golden coconut only to be found in the Princes' Gardens.

"Five hundred nuts to a picul (133½ lb.) of copra is a general average yield. With the leaf length only 12 ft. it was found convenient to plant the palms 24 ft. by 20 ft., which gave 90 to the acre, a number nearly double to that required when planting big palms. In the fifth year the trees yielded 30 nuts apiece, so that 2,700 nuts would be obtained from trees planted 90 to the acre, while in the ninth year, which is the sixth yielding year, 120 nuts were yielded per tree in full bearing, making 10,800 nuts per acre or 21¾ piculs of copra per acre. The big coconut does not produce till after its fifth year, but in the ninth year 45 trees per acre would probably yield 40 nuts apiece or 1800



nuts per acre, giving 8 piculs of copra per acre. The nuts of the dwarf trees can be easily and rapidly picked and also inspected for beetles and other pests. Almost  $2\frac{1}{2}$  times the number of nuts per picul of copra have to be handled as compared with the larger nuts, but it is suggested that this may not be of great consequence when working with newly devised methods and machinery, dealing with large quantities."

**Catalogue of the Library.**—The first printed Catalogue of the Library of the Royal Botanic Gardens, Kew, was published in 1899, and is a volume of nearly 800 pages, forming Additional Series III to the *Kew Bulletin*. Since its appearance an annual supplement, including the accessions for each year, has been published as an appendix to the *Bulletin*. The first supplement forms Appendix IV to the volume for 1899 and the last issued, comprising the additions received during 1915, forms Appendix II to the volume for 1916. There are consequently 19 supplements, and the need for consolidating these was obvious. It was decided therefore to re-issue in one supplement all the additions to the library received since the catalogue was published, and the work of arrangement and revision was completed in the autumn of 1915 when, however, owing to difficulties arising from the war, it could not be printed. It was not possible therefore to send it to the press till last year, and as the usual annual supplement to the catalogue was suspended after that for 1915, the additions received after that year have been omitted and will form another supplement, to cover the years 1916–20, which, it is hoped, will be published next year. Like the original catalogue the supplement is printed on one side of the paper only, and the same arrangement of the entries into 4 sections (I. General, II. Travels, III. Periodicals, and IV. Manuscripts) has been followed. The volume consists of 433 printed pages, is priced at £1 net, and is sold by Messrs. Gale & Polden, Ltd., Royal Botanic Gardens, Kew. It should be mentioned that additions to sets of periodical and serial works which appear in the original catalogue are not included in the supplement, nor, as a rule, are excerpts from periodicals and other publications received in the library, though such excerpts are welcomed and are often found of much use as "tracts," in which collection they are placed and are easily found without the aid of the catalogue.

In the annual notes on presentations to the library, published in the *Kew Bulletin*, it has been the practice to mention the more important additions received as such during each year. From these notes it will be seen that the establishment is indebted to a wide circle of authors, publishers and other persons, to governments of various countries, to botanical, agricultural and other institutions, as well as to an annual grant from H.M. Stationery Office, for the means of maintaining its library, the efficiency of which is of paramount importance. It is not possible, nor necessary, to give details here of the many valuable presentations which are included in this supplement. It may, however, be stated that the greater number of the works by authors before the time of Linnaeus have been presented by the Bentham Trustees.

S. A. S.





FIG. 1.—The Grove of *Quercus Calliprinos* near Kebara, one mile from Enab in the Judean Hills, from a photograph taken in 1918.



FIG. 2.—Abraham's Oak (*Quercus Calliprinos* [Sindian]), from a photograph taken by Col. Robins, D.P.M., for Major Portal in 1918.